

# How do patients with chest pain access Emergency Department care?

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**Background** It is important that patients with symptoms of acute coronary syndrome receive appropriate medical care as soon as possible. Little is known about the preadmission actions that patients with chest pain take before arrival at the Emergency Department (ED).

**Objective** This study aimed to describe the actions of patients with chest pain or pressure after onset of symptoms. What is the first action following onset of symptoms? Who is the first lay or professional person to be contacted? Which steps are taken first? How is the patient transported to the hospital?

**Methods** Consecutive patients, arriving at the ED of two large hospitals in Belgium, were asked additional questions during the initial assessment.

**Results** Overall, 35% of 412 consecutive patients with chest pain admitted to the ED were diagnosed with acute coronary syndrome. A total of 57% contacted a GP between symptom onset and arrival at the ED. Only 32% of the patients were transported to the ED by ambulance, 16% drove themselves and 52% arrived by other means of transport (by family, neighbour, GP, public transport).

## Introduction

Early referral of possible acute coronary syndrome (ACS) patients to a hospital is crucial in optimizing survival and subsequent quality of life [1–3]. It is very difficult for patients to correctly attribute symptoms to either a cardiac or other cause. Half of all ST segment elevation myocardial infarction patients do not experience a typical episode of acute severe chest pain – the so-called ‘Hollywood heart attack’ – but have atypical symptoms. Patients’ expectations of symptoms are crucial in taking action and contribute considerably towards patient delay [4–10].

Little is known about the actions taken by patients with chest pain in Belgium before assessment at the

**Conclusion** In Belgium, the GP is still the first professional to be contacted for most patients. Other patients initially rely on their partner, family or friends when symptoms emerge. Too often, patients with chest pain rely on other transport to get to the ED instead of calling the Emergency Medical Services. This study included only patients who ultimately attended the ED. *European Journal of Emergency Medicine* 00:000–000 Copyright © 2016 Wolters Kluwer Health, Inc. All rights reserved.

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Emergency Department (ED). Therefore, the aim of this study is to gain insight into the different actions of a patient with chest pain and to examine differences in actions according to sex, level of anxiety, localization and duration of the symptoms and previous experience with similar symptoms.

## Methods Population

The study population included consecutive patients presenting with chest pain or oppression at the ED or chest unit of the University hospital of Leuven (UHL) and the regional hospital of Genk, Belgium, between November 2013 and May 2014. They were 18 years of age or older and did not have any mental impairment. Exclusion criteria were as follows: arrival at more than 24 h after the onset of symptoms, a clear traumatic cause of the complaints and symptoms that were considered a recurrence of known symptoms with a previous non-cardiac diagnosis.

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## Measurements

The questionnaire was completed by the treating physician after a verbal consent was provided by the patient, recorded in the file. The interview consisted of eight questions with predefined multiple choice answers: when did this episode of chest pain or oppression, which has led you to the ED, start? Did you have similar symptoms before? What was your level of anxiety? Where were you when noticing the symptoms? What was your first action when feeling central chest pain (crushing or squeezing) and in case you did not take any action, who was the person taking action and what did he or she do? If you contacted the GP or ambulance service, what did they do? How did you finally go to the hospital?

Study coordinators were trained in clinical data collection.

Anxiety was measured on a Likert scale of 0 to 10 (0 indicated no fear and 10 indicated considerable fear) [11].

## Analysis

The initial surveys were completed by a team of GPs, a cardiologist and an emergency physician. The results are presented in a descriptive manner. We described sequences of actions by patients and their caretakers. Differences between groups were tested using the  $\chi^2$  or the Fisher's exact test (in case of categorical variables) or the Kruskal–Wallis test (in case of continuous variables).

## Ethical aspects

The study was approved by the ethical review board of both hospitals (coordinating review board is UHL: no S55411).

## Results

### Participants

We included 414 patients, 214 in Leuven and 200 in Genk. The average age of the patients was 63 years (18–93) and 70% were men. Overall, 87% were of Belgian origin, 38% had a higher secondary education and 29% a bachelor degree or more. A total of 71% of the patients scored at least 5 on the anxiety scale. Symptoms started when the patient was at home in 78% of the cases. A total of 57% of the patients had already similar symptoms in the past.

A total of 30% of the patients with chest pain initially had no additional symptoms, 35% additionally had dyspnoea, 33% had general vasovagal reactions and 12% had other symptoms.

The final diagnoses in hospital were ACS in 35% of the cases, other cardiovascular events (including pulmonary embolism) in 20% and noncardiovascular events in 45% (Table 1).

No patient included in the study died before leaving the ED.

Table 1 Patient characteristics

	<i>n</i> (%)
Age	
18–34	23 (6)
35–49	55 (14)
50–64	125 (31)
65+	199 (50)
Sex	
Female	123 (30)
Male	282 (70)
Origin	
Belgium	285 (87)
The Netherlands	17 (5)
Italy	13 (4)
Other	13 (4)
Education	
Primary	17 (7)
Lower secondary	30 (13)
Higher secondary	91 (38)
Bachelor	68 (28)
Master	34 (14)
Duration between the onset of symptoms and arrival at the ED (h)	
< 1	37 (9)
1–3	119 (29)
3–12	131 (32)
> 12	122 (30)
Similar symptoms in the past	
No	175 (43)
Yes	236 (57)
Additional to chest pain	
Dyspnoea	103 (25)
Dyspnoea and vasovagal reactions	39 (10)
Vasovagal reactions	93 (23)
Other	50 (12)
None	124 (30)
Place of onset of symptoms	
Home	322 (78)
Work	34 (8)
Public	26 (6)
Family	10 (2)
Other	19 (5)
Diagnosis	
ACS	142 (35)
Other cardiovascular	84 (21)
Other	183 (45)
Anxiety	
0	34 (9)
1–4	82 (20)
5–8	236 (59)
9–10	49 (12)
Transport to the ED	
Self-drive	65 (16)
Ambulance	133 (32)
Others	213 (52)

ACS, acute coronary syndrome; ED, Emergency Department.

## Actions

A total of 45% of patients initially contacted the GP. Only 21% directly contacted the Emergency Medical Services (EMS) and 34% took other action (no action, call a nurse in the nursery home, take medication, call cardiologist). Overall, 56% of the patients with chest pain finally contacted the GP (either their own GP or a GP on duty) before leaving for the ED (Table 2).

If patients initially took no action (20%), their partner took action in 36%, other family or a neighbour in 23%, caregivers in 26% and other individuals in 15% of cases. Overall, 40% of these persons who took action called the GP and 15% called the EMS. Only 25% of the persons

**Table 2** Actions taken by a patient with chest pain

	<i>n</i> (%)
First action	
GP contact	184 (45)
ED	84 (21)
Other	141 (34)
Total	409 (100)
Second action	
GP contact	66 (16)
ED	55 (13)
Other	32 (8)
Not applicable	259 (63)
Total	412 (100)
Both actions together (total)	
GP contact	232 (57)
No GP contact	178 (43)
Total	410 (100)

ED, Emergency Department.

immediately brought the patient to ED by their own means. The remaining 20% could not be categorized (already at the hospital for other reasons, called another specialist, called a taxi).

If the GP is involved in the process, 39% of the GPs asked the patient to come over to their practice and then referred them to the ED. A total of 28% of the GPs immediately visited the patient and were referred to the ED. Five percent of the GPs immediately called the EMS and 12% advised the patient to leave for the ED immediately (Table 3).

Nine percent of all patients arrived at the ED within 1 h after the onset of symptoms and 29% between 1 and 3 h (Table 1).

Of the patients, who were eventually diagnosed with ACS, almost half were initially driven to the hospital by a partner, family member or a neighbour (others) (46%). A total of 43% arrived by EMS ambulance and 11% drove to the ED themselves (Table 4).

Patients driving to the ED by themselves on average were 59 years old, which is slightly lower than the overall average (63 years).

### Determinants

Women (67%) more frequently relied on the GP for an initial opinion versus 52% of men ( $P=0.02$ ). Two percent of the women and 12% of men arrived at the ED within 1 h after the onset of symptoms. Overall, 70% of

**Table 3** Action of GP after being called by the patient

	<i>N</i> = 243 [ <i>n</i> (%)]
Referring patient directly to ED at the telephone	32 (12)
Calling emergency services and visit patient	11 (5)
GP asking patient to come to the surgery and referring to ED	94 (39)
Visiting patient immediately and then referring to ED	67 (28)
Visiting patient during the day and then referring to ED	16 (7)
Other	23 (9)

ED, Emergency Department; GP, general practitioner.

**Table 4** Means of transport according to diagnosis

	Diagnosis [ <i>n</i> (%)]			
	ACS	Other cardiovascular	Other	Total
Self-drive	15 (11)	13 (15)	36 (20)	64 (16)
Ambulance	61 (43)	28 (33)	44 (24)	133 (33)
Others	66 (46)	43 (51)	103 (56)	212 (52)
Total	142 (100)	84 (100)	183 (100)	409 (100)

ACS, acute coronary syndrome.

**Table 5** Differences in action and symptoms by sex

	Female [ <i>n</i> (%)]	Male [ <i>n</i> (%)]	Total <i>N</i>
GP contact during the process (total)			
Yes	82 (67)	145 (52)	227
No	62 (51)	170 (60)	232
Total	122 (118)	281 (112)	403
Duration between symptoms onset and arrival at the ED (h)			
< 1	2 (2)	33 (12)	35
1–3	36 (30)	80 (29)	116
3–12	43 (35)	88 (31)	131
> 12	41 (34)	79 (28)	120
Total	122 (100)	280 (100)	402
Transport to the ED			
Self-drive	13 (11)	51 (18)	64
Ambulance	23 (19)	109 (39)	132
Other	86 (70)	122 (43)	208
Total	122 (100)	282 (100)	404
Chest pain and other symptoms			
Dyspnoea	31 (25)	71 (25)	102
Dyspnoea and vasovagal reaction	16 (13)	22 (8)	38
Vasovagal reaction	23 (19)	69 (25)	92
Other	14 (11)	33 (12)	47
None	38 (31)	85 (30)	123
Total	122 (100)	280 (100)	402

ED, Emergency Department.

the women and 43% of the men were driven to the ED by a neighbour or family member (Table 5).

More than half of the patients (54%) brought in by ambulance arrived at the ED within 3 h after the onset of symptoms (14% within 1 h). Of all patients driving themselves, 31% arrived within 3 h (5% within 1 h) ( $P<0.01$ ) (see Table, Supplemental digital content 1, <http://links.lww.com/EJEM/A121>, which explains the duration between symptoms onset and arrival at the ED according to patient characteristics).

A total of 89% of the patients, arriving at the ED within 1 h after the onset of symptoms, presented themselves with an anxiety score of at least 5 (66% more than 6) versus 66% arriving at the ED after more than 3 h after the onset of symptoms ( $P=0.16$ ).

As mentioned before, there were no marked differences between means of transport and the final diagnosis (Table 5).

### Discussion

Of all chest pain patients admitted to the ED, 56% had a serious cardiovascular disease, of whom 35% had ACS. Overall, GPs were involved in the process of diagnosis

and referral in 57%. The main first action of the patient with chest pain was calling the GP (30%); only 5% directly called the EMS system and all of these were men.

In Belgium, access to any physician or to the hospital services is free. However, the GP is an established and familiar route to medical care and many patients believe that calling a GP should always be their first course of action. The average GP sees one or two patients with chest pain a week [12].

A number of investigators have reported that calling a physician's office increases delay in seeking treatment [13–17]. This is confirmed in our analysis as 36% of patients with symptoms for over 12 h when arriving at the ED also contacted their GP first versus 7% of the patients with a maximum of 1 h from the onset of symptoms. The increase in delay occurs initially for a variety of reasons including the GP not perceiving the symptoms as cardiac in nature, self-medication by the patient or the inability to contact the GP immediately [18].

It is remarkable that only 33% of these chest pain patients finally arrived at the ED by ambulance, 16% arrived driving their own car and 52% were brought in by their partner, family or neighbours. There was a significant sex difference in ambulance use; 19% of the women and 39% of the men used the EMS. This is not in agreement with previous findings from other countries, where women were more frequently transported by EMS [19,20].

The reason for not using the EMS for transport to the hospital should be examined further using both quantitative and qualitative designs. If the reasoning behind this observation is known, transportation by ambulance can be encouraged and facilitated by public campaigns.

In 62% of cases, the delay for patients in arriving at the ED was more than 3 h. This results from the complex process of decision-making after the onset of chest pain, including cognitive and emotional processes, individual beliefs and values, and the influence of the context of the event [14].

Consistent with previous qualitative research in Belgium, in 46% of the cases, the transport facilitator was a family member or a neighbour. The main reason for this observation could be a time-saving and cost-saving component (in Belgium, the patient has to pay for part of the ambulance services). This kind of use of own transport should be discouraged because transporting patients with a suspected ACS without professional supervision, including the availability of a defibrillator, is not recommended [10,13].

In the UK, the recommendation and the public health campaigns encouraged all patients with chest pain to phone 999 immediately. If the discomfort is only minor or

has resolved, it may be more appropriate to either see a GP, call NHS 111 or attend a local walk-in centre <http://www.nhs.uk/Conditions/chest-pain/Pages/Introduction.aspx>.

### Strengths and weaknesses

The strength of this study lies in the fact that it fits with daily life actions of patients and caregivers. We have gathered detailed information on a group of subsequent patients with chest pain admitted to the ED and data were collected in two different hospitals, decreasing the risk of reporting results specific for only one hospital.

The weakness of the study lies in the fact that the answers are provided by the patient instead of being observed by a researcher. Furthermore, we do not know what has happened with patients who had chest pain, but never visited an ED. They were either assessed or treated by the GP, self-medicated or waited for the symptoms to disappear without treatment. However, a study exploring this group is difficult to design and operationalize.

### Conclusion

GPs still play a major role in the triage and referral of patients with chest pain in Belgium. However, some of the patients directly contact the EMS without contacting a GP, which may have implications for future training and experience of young GPs.

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#### Conflicts of interest

There are no conflicts of interest.

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